

AMENDMENT OF CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1. (Currently Amended) A blood pump actuator to generate a driving force for driving a blood pump, the blood pump actuator comprising:

a motor unit having a stator and a rotor, and rotating to generate a rotating force;

a cam unit to convert the rotating motion of the motor unit into a rectilinear reciprocating motion; and

a bellows unit comprising a bellows, which is expandable and contractible and contains a fluid therein, and an upper bellows plate and a lower bellows plate respectively attached to the upper and lower ends of the bellows,

wherein the lower bellows plate moves upwards and downwards in a vertical direction according to the rectilinear reciprocating motion of lower bellows plate, and the bellows repeatedly expands and contracts according to the vertical movement of the lower bellows plate, and provides a fluidic pressure output to drive the blood pump.

2. (Original) The blood pump actuator according to claim 1, wherein the cam unit comprises:

a cam having a cam guide continuously formed around an outer circumferential surface of a cylindrical body of the cam;

a cam cover mounted to an upper end of the cam; and

a cam gear mounted to an end of the cam cover such that the cam gear is concentric with the cam and receives the rotating force of the motor unit.

3. (Original) The blood pump actuator according to claim 2, wherein the bellows unit is

placed on the upper end of the cam unit, and the lower bellows plate comprises a lower bellows plate extension part which extends, at an edge of the lower bellows plate, towards the cam unit, is perpendicular to the lower bellows plate, is spaced apart from the cam unit, and is placed outside the cam unit, wherein the lower bellows plate extension part comprises a cam guide engagement part provided on an inner surface thereof to engage with the cam guide.

4. (Original) The blood pump actuator according to claim 3, wherein the cam guide comprises a protruding cam guide, while the cam guide engagement part comprises a depressed cam guide engagement part.

5. (Original) The blood pump actuator according to claim 3, wherein the cam guide comprises a depressed cam guide, while the cam guide engagement part comprises a protruding cam guide engagement part.

6. (Original) The blood pump actuator according to claim 3, wherein the cam guide has a sine curve shape.

7. (Original) The blood pump actuator according to claim 3, wherein the cam guide has an asymmetrical curve shape.

8. (Original) The blood pump actuator according to claim 3, wherein the cam guide has a stepped shape.

9. (Original) The blood pump actuator according to claim 3, wherein the cam guide has a linear function curve shape having a peak and a trough.

10. (Original) The blood pump actuator according to claim 3, wherein the lower bellows plate extension part is continuously formed around an outer circumferential surface of the lower bellows plate.
11. (Original) The blood pump actuator according to claim 3, wherein the lower bellows plate extension part is discontinuously formed around an outer circumferential surface of the lower bellows plate.
12. (Original) The blood pump actuator according to claim 11, wherein the lower bellows plate comprises two or more discontinuous lower bellows plate extension parts which are arranged at respective positions dividing the lower bellows plate into even sectors.
13. (Original) The blood pump actuator according to claim 1, wherein the motor unit comprises a housing at a lower part thereof and is placed below the bellows unit, with a bellows guide extension part provided on an edge of the lower bellows plate and extending toward the cam unit, while the housing of the motor unit is provided with a bellows guide to guide the bellows guide extension part.
14. (Original) The blood pump actuator according to claim 13, wherein the bellows guide extension part comprises a rod-shaped part, while the bellows guide comprises a linear bushing to receive the bellows guide extension part therein.
15. (Original) The blood pump actuator according to claim 1, further comprising: a reduction gear mechanism placed between the motor unit and the cam unit.

16. (Original) The blood pump actuator according to claim 15, wherein the reduction gear mechanism comprises a planetary gear mechanism.

17. (Original) The blood pump actuator according to claim 16, wherein the planetary gear mechanism comprises: a sun gear having a gear part around an outer circumferential surface thereof; a carrier placed at a predetermined height different from a height of the gear part of the sun gear; at least two or more planetary gears mounted on a surface of the carrier and engaging with the gear part of the sun gear; and a ring gear having a gear part around an inner circumferential surface thereof and engaging with the planetary gears, wherein the carrier is mounted to an inner surface of the rotor, the sun gear is concentric with the cam unit, and the ring gear is integrally formed with the cam gear.

18. (Original) The blood pump actuator according to claim 1, further comprising: a pressure regulating unit to regulate pressure in the bellows.

19. (Original) The blood pump actuator according to claim 18, wherein the pressure regulating unit comprises:

a pressure gauge connected to the bellows through a pressure connection part and measuring pressure of the fluid in the bellows;

a fluid pump connected to the pressure connection part and supplying or discharging the fluid to or from the bellows;

control valves respectively placed between the bellows and the pressure gauge and between the pressure gauge and the fluid pump and controlling the flow of the fluid; and

a pressure control unit to control both the control valves and the fluid pump in response to pressure in the bellows measured by the pressure gauge, thus maintaining inner pressure of the bellows within a predetermined pressure range.

20. (Original) A blood pump system, comprising:

the blood pump actuator of claim 1; and

a diaphragm which communicates with the bellows of the blood pump actuator through a connection part and is deformed according to changes in volume of the bellows, thus pumping blood from the blood pump system to a desired place in the body of a patient according to the deformation of the diaphragm.